

REMARKS

The application has been carefully considered in light of the Office Action dated March 10, 2004 (Paper No. 20). Claims 1, 3 to 6, 11 and 12 are pending in the application, of which Claims 1, 6, 11 and 12 are independent. Claims 1, 3 to 6, 11 and 12 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,883,821 (Komaki) in view of U.S. Patent No. 5,390,035 (Kasson). In light of the amended claims and supporting remarks, reconsideration and withdrawal of these rejections are respectfully requested.

The present invention concerns image processing using a multi-dimensional look-up table having non-uniform intervals. Integer computations are used to generate weight tables which are then used to interpolate values from the look-up table. Through the selection of appropriate constants used in the integer computations, possible computational errors introduced by the integer computations are reduced.

Turning to specific claim language, amended independent Claim 1 is directed to performing image processing on image data expressed in plural components using a multi-dimensional look-up table and outputting processed image data. The method includes, in part, generating weight values for a multi-dimensional look-up table which has grids arranged at non-uniform intervals. The weight tables are calculated by an integer computation including multiplication by a constant which has a large value greater than a value corresponding to a maximum interval of the grids, and interpolation of the values of the multi-dimensional look-up table using the weight values wherein the interpolation is executed by an integer computation and uses the constant as a divisor. Thus, the constant is used twice, once as a multiplier when generating weight values, and as a divisor when performing the final interpolation.

In contrast, Komaki discloses use of simplified arithmetic expressions to reduce the number of operations used in an interpolating operation. In the Office action, it is proposed that Komaki discloses integer computations used in the arithmetic operations at column 2, lines 10 to 30 and again at column 9, lines 35 to 44. However, the cited portions of Komaki disclose no such integer computations. At column 2, lines 10 to 30, Komaki merely discusses the nature of the interpolation space used in the methods of Komaki. Starting at column 9, line 35, Komaki only discusses the size of the interpolation lattice expressed as a whole number and never discusses integer computations used in conjunction with interpolations. In fact, a careful reading of Komaki reveals that the word “integer” is never used by Komaki to discuss any aspect of the disclosed method. Therefore, Komaki is entirely silent on the possible use of integer computations for the arithmetic operations. As Komaki does not even address integer computations, Komaki is not seen to disclose Applicant’s method of performing integer computations for interpolations. Specifically, Komaki neither discloses nor suggests using a constant having a large value greater than a maximum grid spacing as a multiplier to generate a weight value and then using the same constant as a divisor during interpolation.

Amended Claim 3 calls for the constant’s value to be a power of 2. In the Office action, it is proposed that Kasson discloses “a sufficiently large power of 2” used as a constant within an interpolation function. However, this is a mischaracterization of the disclosures of Kasson. In the cited portion of Kasson, namely column 2, lines 55 to 65, Kasson notes that “(t)here are 2^{24} points in the domain of the print color function which could be sampled, so it would be prohibitively time-consuming and storage-intensive to measure and store all of these values. Rather, the function may be approximated using a smaller set of measured domain values (sample points), and using interpolation to compute the approximate values for all of the other

domain values.” While the whole number, namely 2^{24} , used to describe the potential size of a domain of a print function is a power of 2, there is no disclosed relationship between the domain size of the print function and a constant that is used to both calculate a weight value and as a divisor during interpolation of a multi-dimensional look-up table. Furthermore, there is nothing in Kasson that suggests interpolation may be performed using integer computations. Therefore, modification of the disclosure of Komaki in light of the disclosure of Kasson would not yield Applicant’s claimed interpolation process using a constant having a large value greater than a maximum grid spacing as a multiplier to generate a weight value and then using the same constant as a divisor during interpolation.

Amended independent Claim 6 is a claim to an apparatus implementing the method of amended Claim 1. Therefore, Applicant submits that the preceding comments in support of Claim 1 are applicable to Claim 6 as well.

Amended independent Claim 11 is a claim to a computer readable medium having a computer program code used to implement the method of claim 1. Therefore, Applicant submits that the preceding comments in support of Claim 1 are applicable to Claim 11 as well.

Amended independent Claim 12 is a claim to a computer readable medium having stored data used to implement the method of claim 1. Therefore, Applicant submits that the preceding comments in support of Claim 1 are applicable to Claim 12 as well.

The other pending claims in this application are each dependent from the independent claims discussed above and are therefore believed patentable for the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, CA office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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